

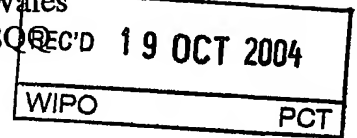


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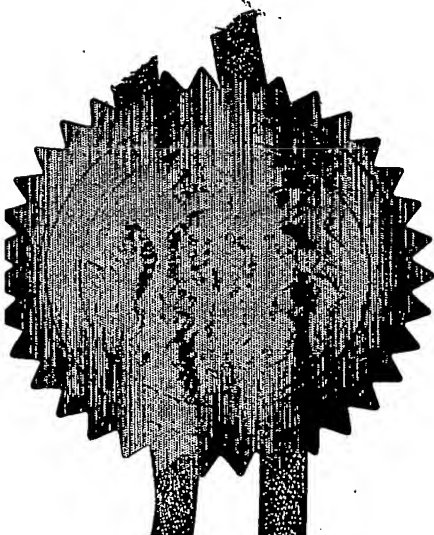
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The Patent Office

Cardiff Road
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South Wales
NP10 8QQ

1. Your reference 9652 GB/CAH

2. Patent application number
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15 AUG 2003

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3. Full name, address and postcode of the or of each applicant (underline all surnames)

Hotpods Limited
The Cottages
Regent Road
Altrincham
Cheshire
WA14 1RX

0869439 0001

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

Incorporated in England and Wales

4. Title of the invention OVEN AND A FOOD DELIVERY VEHICLE COMPRISING SAID OVEN

5. Name of your agent (if you have one)

Abel & Imray

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

20 Red Lion Street
London
WC1R 4PQ
United Kingdom

Patents ADP number (if you know it)

174001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number
(if you know it)

Date of filing
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7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if

Yes

- a) any applicant named in part 3 is not an inventor, or
 - b) there is an inventor who is not named as an applicant, or
 - c) any named applicant is a corporate body.
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Continuation sheets of this form

Description 9

Claim(s) 3

Abstract 0

Drawing(s) 1

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 9/77)

Request for substantive examination (Patents Form 10/77)

Any other documents (please specify)

11. I/We request the grant of a patent on the basis of this application.

Signature *Abel & Imray*
Abel & Imray

Date
15 August 2003

12. Name and daytime telephone number of person to contact in the United Kingdom Ceris Humphreys 01225 469 914

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Oven and a food delivery vehicle comprising said oven

The invention relates to ovens and especially to mobile ovens, in particular to ovens arranged on vehicles.

5 It is well-known to provide ovens on certain kinds of vehicle, for example on camper vans which are to be used as mobile homes, and on vehicles of a kind used for home delivery of hot, cooked meals especially to the elderly and/or infirm. The known ovens are in general heated by
10 means of a gas supply from a cylinder of compressed gas which is carried on the vehicle. The need for a gas supply on the vehicle represents a fire and explosion hazard for example, if the vehicle is involved in an accident or if the gas cylinder otherwise accidentally is damaged or

15 becomes ignited. Also, it is inconvenient that the gas cylinder must periodically be replaced and that it sometimes occupies a relatively large amount of space on the vehicle. It is also inconvenient that, in some jurisdictions, it is a legal requirement that a gas
20 cylinder be stored in a separate service space which must be ventilated to the outside atmosphere.

It is also known to provide electrically heated ovens on a vehicle, but such ovens are insufficiently powered to attain the temperatures necessary for fully cooking food
25 and/or require a dedicated generator which adds to the complexity and cost of manufacture. There is a need for a mobile oven which is safe and can heat food efficiently to temperatures which are appropriate for the cooking of food

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and/or the regeneration of food from the frozen state.

The invention provides a convection oven for use in a vehicle, having an oven cavity with an air inlet and an air outlet, an air feed conduit for feeding an air feed into
5 the oven through the air inlet and a heating arrangement for heating the air feed before it is fed into the oven cavity, the heating arrangement comprising at least one electrical heating device, and being arranged to maintain a temperature of at least 130°C within the oven cavity. It
10 has been found that the arrangement of the invention is particularly effective in cooking multiple units of food, such as individual meals, and/or the regeneration thereof from the frozen state in an oven on a vehicle.

The term "convection oven" is used herein to refer to
15 ovens in which heating is effected principally by convection.

Advantageously, the heating arrangement comprises a first heater and a second heater. Preferably the arrangement is such that the air feed is heated by the
20 first and second heaters in series. That arrangement has been found particularly advantageous in that it has been found that it makes possible particularly effective heating of the multiple units of food, such as individual meals, in an oven on a vehicle. It is believed that is because that
25 preferred arrangement having first and second heaters in series for heating an air flow can be made to generate relatively high heat flux values within the oven. It is believed that the effectiveness of heating of the

individual food units in many previously known delivery vehicles having ovens is hampered by the fact that the packing density of the food units is of necessity high, so that the ratio of occupied volume to void space within the oven is normally high, at least when the vehicle commences its delivery programme. In an oven, effective heating of items within the oven is dependent upon heat flux, which in the case of a convection oven is made up principally of convective heat flux, with any radiative component attributable to radiation from the oven walls and other fittings being small relative to the convective component. Therefore, in the case of a convection oven, the effective heating of items can be regarded as being determined essentially by the heat flux attributable to the convective component, which can be regarded as proportional to the temperature difference between the items to be heated and the local air flow. That difference will of course vary as the items are heated but is a complex function of the convection air flow characteristics and of the characteristics of the items to be heated, for example, volume, surface area and specific heat capacity.

The oven of the invention is advantageously arranged for regenerating from frozen and/or heating 10kg or more of food, and preferably at least 10kg food in individual units of 450g or less. Advantageously, the oven cavity has an internal volume of not exceeding 0.3m^3 , and preferably not exceeding 0.2m^3 . Advantageously, the internal volume of the oven cavity is in the range of from 0.05 to 0.15m^3 .

In an especially preferred oven, the internal volume of the oven cavity is not exceeding 0.15m^3 , and that the internal volume of the oven cavity is arranged to receive a multiplicity of individual food portions of not exceeding
5 450g each. Advantageously, the oven cavity internal volume is adapted to receive at least 10 portions, more preferably from 20 to 60 portions, for example about 30 to 40 portions, of from 300 to 450g each, especially about 375g each.

10 The first and/or the second heater may be connected to a vehicle motor and can be powered thereby. Preferably, one of said first and second heaters is powered by the combustion engine of the vehicle and the other is powered by a further combustion device. Advantageously, the first

15 heater is an air to air heater. Preferably, the first heater comprises a combustion device for generating hot combustion gases. The hot combustion gases can then be passed in heat exchange relationship with the air feed. Preferably, the first heater device can be powered by the
20 same fuel as the vehicle, so that the vehicle's usual fuel can be used to power the first heater.

Advantageously one of said first and second heaters comprises electrically powered heater elements which are located in the air feed conduit.

25 The invention also provides a vehicle comprising an oven according to the invention. Advantageously, the vehicle comprises an alternator for converting of energy into electrical power for use by at least one of the

heaters, preferably for said second heater. The vehicle may comprise two ovens, which may each be heated by a common heating arrangement. In the latter case, the common heating arrangement may comprise a hot air feed conduit
5 comprising diverter means for controlling the proportion of the hot air feed conveyed to each oven.

Advantageously, the oven comprises a control device arranged to permit regulation of said first and second heaters. Advantageously, the oven comprises an adapter
10 means arranged to permit the first and second heaters to be selectively supplied with mains power when desired. That enables the oven to be operated using mains power when the vehicle is stationary, for example, when food is being prepared at a central distribution depot before the vehicle
15 departs to commence delivery.

The oven is arranged to permit the oven cavity to be held at a temperature which is sufficiently high for food to be defrosted and heated to a suitable serving temperature in an appropriate period of time. Furthermore,
20 the temperature is also preferably such that raw food can be cooked in an appropriate time. In practice, the arrangement will generally be such that the oven cavity can be maintained at a temperature of at least 140°C, advantageously at least 150°C and preferably at least
25 180°C. It will be appreciated that the arrangement should be such that the power consumption by the oven does not exceed an amount which can be supplied by the vehicle without detrimentally affecting the vehicle's other

functions.

The invention further provides a vehicle having a power source for powering drive means of the vehicle, the vehicle further including an oven for cooking food, heat
5 for heating the oven being generatable at least in part from said power source and the oven being arranged to be maintainable at a temperature of not less than 130°C.

One embodiment of the invention will now be described in detail, by way of example, with reference to the
10 accompanying drawing, which is a schematic diagram of an oven according to the invention.

Referring to the drawing, the oven 1 comprises an oven housing 2 enclosing an oven cavity. Although not shown in the drawing, the oven cavity is adapted to receive a
15 multiplicity (about thirty) of food items on individual plates or trays, the arrangement being such that air is able to circulate convectively between and around the individual plates or trays. The food items are typically frozen, pre-cooked food items, especially individual meals,
20 at a temperature of, for example, -15°C. The oven cavity may, if desired, include a fan for enhancing distribution of air around the contents of the oven and/or an extraction fan arranged to promote/maintain the air flow in the oven.

If present the extractor fan is preferably arranged to
25 extract air at the same flow rate as the air injected into the oven. An air inlet 3 is provided in a lower region of a side wall 4 of the housing. An air outlet 5 is provided in a top wall 6 of the housing. Communicating with the air

inlet 3 is an air passageway 7 which is interrupted by a first heater 8 and a second heater 9. The passageway 7 has an air entrance opening 10 through which an air feed can be taken in and defines a continuous path for the air feed
5 through the first and second heaters 8, 9 to the oven inlet 3.

The first heater is a diesel (or petrol) powered air heater, for example of the kind known as AIRTRONIC made by Eberspächer Deutschland, and can heat the air feed to a
10 temperature of about 90 to 110°C above ambient temperature. The first heater 8 is powered by fuel from the vehicle's tank of diesel fuel, as indicated by arrow F. The first heater 8 also takes in combustion air, as indicated by arrow C, and has a vent for escape of exhaust gas as
15 indicated by arrow E.

The second heater 9 comprises electric resistance elements mounted in a chamber connected at each end to adjacent portions of the passageway 7. The passageway 7 may comprise a convoluted portion in the region of the
20 resistance elements to prolong the contact time between the air feed and the resistance elements. The second heater 9 is arranged to be powered selectively by an on-vehicle power source or an external power source, for example, mains electricity. The on-vehicle power system is powered
25 from the vehicle engine 11, which feeds electrical power via an alternator 12 (12V/110V) and a regulator 13 to a control device 14. For connection into an external power source for example mains electricity the vehicle comprises

a connector 15 and a 240V/110V transformer 16 which carry an electrical current, when the connector 15 is in connection with the external power source, to the control device 14. The control device 14 controls the second
5 heater 9 and also controls certain functions within the oven itself.

In use of the oven system, the oven may be heated, whilst the vehicle is travelling or during short stops, by means of the diesel powered heater 8, and the second heater
10 9 powered from the vehicle engine. The oven may if desired be pre-heated to a temperature of, for example, 160°C or more before placing the food therein.

If the vehicle is stationary for any length of time, for example, before commencement of a delivery journey, the
15 control device may be used to switch the power supply from the vehicle engine to mains power, the connector being used to connect to a convenient external mains power source.

In the arrangement shown, the oven cavity has a volume of about 0.11m³ and the described heating arrangement is
20 able to generate and maintain an oven temperature of more than 130°C when the oven is filled with 30 individual meals of 375g each.

Although not shown in the drawing, it is as already mentioned advantageous for the vehicle to be fitted with
25 two ovens, which may conveniently be in the form of a pair of cavities formed in a single body and each having a respective access door and heating and control arrangement. That allows for two different types of food item, having

different heating requirements, to be carried, or for one oven to be reduced in temperature once the items contained therein are fully cooked, thereby avoiding overcooking of those items. That may allow for greater flexibility in the range of food items to be carried and/or in the length of the delivery round.

Whilst the oven may be used to regenerate frozen, pre-cooked meals as mentioned above, it may instead be used to cook raw food. It may also, if desired, be used merely to maintain heated meals at a suitable serving temperature, and in that case it may be possible to maintain the desired temperature without switching on the second heater.

If desired other devices, for example, a refrigerator, a freezer or a source of water may additionally be present.

15 The water may be potable or non-potable (and thus suitable for washing only). A heater may be provided for heating the water.

Claims

1. A convection oven for use in a vehicle, having an oven cavity with an air inlet and an air outlet, an air feed conduit for feeding an air feed into the oven cavity through the air inlet and a heating arrangement for heating the air feed before it is fed into the oven cavity, the heating arrangement comprising a heating device that is electrically powered and being arranged to maintain a temperature of at least 130°C in the oven cavity.
2. An oven according to claim 1, in which the heating arrangement comprises a first heater and a second heater.
3. An oven according to claim 2, in which the air feed is heated by the first and second heaters in series.
4. An oven according to claim 2 or claim 3, in which one of said first and second heaters comprises electrically powered heater elements which are located within the air feed conduct.
5. An oven according to any one of claims 2 to 4, in which the first heater and/or the second heater can be connected to a vehicle motor and can be powered thereby.
6. An oven according to any one of the preceding claims, in which the first and second heaters can be powered by power means present on a vehicle motor.
7. An oven according to any one of the preceding claims, in which at least one of the heaters comprises a combustion device for generating hot combustion gases which can be used to heat the air feed.
8. An oven according to claim 7, which comprises heat

exchange means for passing the hot combustion gases in heat exchange relationship with the air feed.

9. An oven according to any one of the preceding claims, which further comprises a control device arranged to permit
5 regulation of said first and second heaters to obtain a desired temperature with the oven cavity.

10. An oven according to any one of the preceding claims, which further comprises adapter means arranged to permit at least a part of the heating arrangement to be selectively
10 supplied with mains power when desired.

11. An oven according to any one of the preceding claims, in which the arrangement is such that the oven cavity can be maintained at a temperature of at least 150°C.

12. An oven according to any one of the preceding claims,
15 in which the volume of the oven cavity is not more than 0.15m³.

13. An oven according to any one of the preceding claims, in which the heating arrangement can generate a temperature of at least 130°C when the oven contains 10kg of food in
20 individual portions of about 400g.

14. A vehicle comprising an oven according to any use of the preceding claims.

15. A vehicle according to claim 14, which vehicle is powered by an internal combustion engine.

25 16. A vehicle having a power source for powering drive means of the vehicle, the vehicle further including an oven for cooking food, the oven being heatable by the said power source to a temperature exceeding 130°C at least during use

of the vehicle.

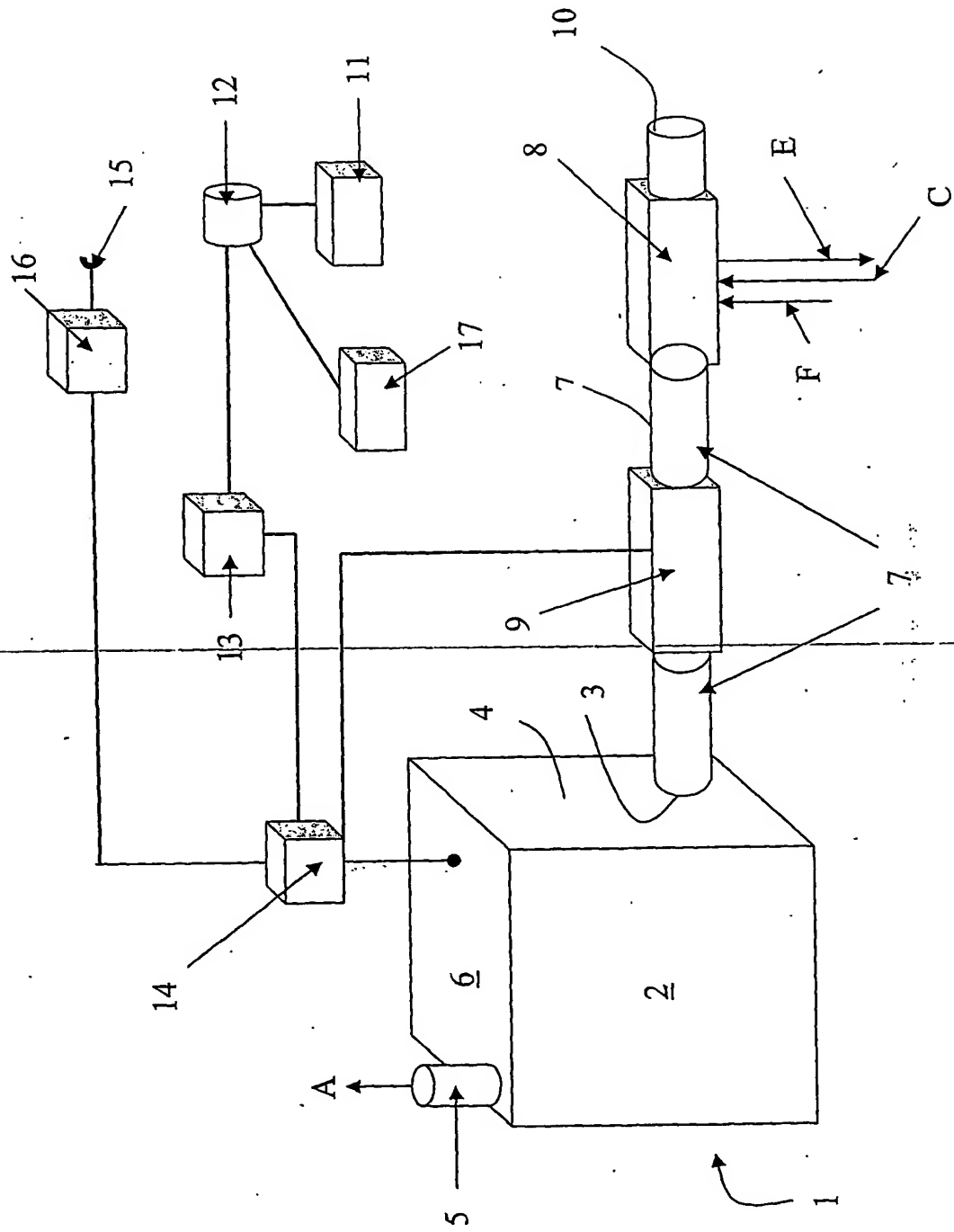
17. A vehicle according to claim 16, in which the power source comprises a combustible fuel.

18. A vehicle according to claim 17, in which the vehicle
5 has an internal combustion engine and the oven is heatable in part from an electrical current derived from said engine.

19. A vehicle according to any one of claims 14 to 18, which comprises two ovens.

10 20. A vehicle according to claim 19, in which each oven comprises a respective heating and control arrangement.

21. A vehicle according to claim 19, in which the ovens are heated by a common heating arrangement.



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